2003 AERIAL SEA TURTLE SURVEY IN THE CHESAPEAKE BAY, VIRGINIA

Final Report

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I. INTRODUCTION

Every year, thousands of sea turtles seasonally utilize the Chesapeake Bay and coastal waters of Virginia as foraging grounds and developmental habitat. Sea turtles migrate north into Virginia's waters in the spring when sea temperatures warm to approximately 18° C (Coles, 1999). Since 1979, the Virginia Institute of Marine Science (VIMS) has recorded high sea turtle mortalities in the spring of the year when sea turtles first migrate into Virginia's waters. Each year, between 200 and 400 sea turtle stranding deaths are recorded within Virginia's waters. The vast majority of these strandings are juvenile loggerhead (*Caretta caretta*) and Kemp's ridley (*Lepidochelys kempii*) sea turtles. Historic stranding data show that 50.0% to 55.0% of the yearly turtle deaths occur in May and June when the turtles first enter the Bay (Lutcavage, 1981; Lutcavage and Musick, 1985; Keinath et al., 1987; Coles 1999; Mansfield et al., 2002). At the time when stranding counts are highest, mean water temperatures range between 18° and 22° C (Coles, 1999). Kemp's ridleys also have an additional peak in strandings in the fall (October and November) when temperatures begin to drop (Lutcavage and Musick, 1985; Coles, 1999).

Despite research efforts over the past 24 years, many questions still remain regarding the sources of spring mortalities. State stranding counts have risen steadily over the last ten years (Mansfield et al., 2002). This increase may in part be due to either intensified fishing interactions, an increase in the sea turtle population. To help address this problem, VIMS, under contract and supplemental funding from the National Marine Fisheries Service (NMFS) and Virginia's Commercial Fishing Advisory Board, conducted aerial sea turtle population surveys in the Chesapeake Bay during the 2001 and 2002 seasons. The primary purpose of these surveys was to document the location of sea turtles and fishing gear deployment during the spring of the year in the Chesapeake Bay, Virginia. With NMFS support, this work continued during the 2003 season. The collection of these aerial data was a result of a no cost extension from the FY02 contract (Contract #: EA1330-02-SE-0075).

During the early 1980's, VIMS' mark-recapture population modeling indicated that approximately 3,000 sea turtles inhabited the Bay each year (Lutcavage, 1981; Lutcavage and Musick, 1985). Due to sampling size and the possibility that some assumptions associated with the population model may not have been met, this number was deemed a minimum estimate. The VIMS Sea Turtle Research Program has used aerial surveys to determine relative abundance and seasonal distribution of sea turtles found in Chesapeake Bay and coastal waters (Byles, 1988; Keinath et al., 1987). Aerial surveys conducted between 1982-1985 and 1994 indicated that 6,500 to 9,700 and 3,000 turtles respectively are found in Virginia's lower Bay waters in any given season (Byles, 1988; Musick et al., 1984; Keinath, 1993). Turtles were recorded only if found observed at the surface or within the first meter of the water column in order to reduce biases associated with seasonal changes in water clarity or sea state (all surveys were conducted when sea states were less than Beaufort force 3) (Byles, 1988). Population estimates were based on the number of aerially observed sea turtles extrapolated to account for the entire Chesapeake Bay. Estimates were adjusted to reflect surfacing times and diving behavior. The largest numbers of sea turtles were observed during the spring of the year. This may be due to greater sea turtle abundances occurring within the spring, differences in

surfacing behavior of the animals in the spring vs. summer/fall, all possibly biasing observer counts and resulting in lower estimates of the turtle population later in the season.

Sea turtle population estimates for the Chesapeake Bay were not consistently quantified for over ten years due to lack of available funding. Surveys were reinstated during the 2001 and 2002 seasons. The distribution of sea turtles aerially observed in 2001 and 2002 was consistent with the distribution of sea turtles observed during VIMS turtle surveys in the 1980's. The highest number of turtles observed were within the spring months and located within the lower Bay, corresponding to the time when turtles are first migrating into Virginia's waters Mansfield et al., 2002). Minimum estimated sea turtle densities (uncorrected for diving behavior) were greatest in June and declined over the course of the season within the lower Bay (Mansfield et al., 2002a, 2002b). Highest average densities were also observed in the upper Bay during June. Maximum Bay population estimates, behaviorally corrected for densities and spatially extrapolated, ranged between 3,900 and 8,100 turtles (Mansfield et al., 2002a, 2002b). These data should be considered a minimum estimate of turtles found within the Chesapeake Bay in 2001 due to biases associated with the methods used. This report, to conclude the FY02 contract (Contract #: EA1330-02-SE-0075), provides current estimates of sea turtle standing stocks in the Chesapeake Bay from aerial surveys conducted during the 2003 season.

II. METHODS:

Aerial surveys were conducted based on the protocol established by VIMS (Byles, 1988; Keinath et al., 1987; Keinath, 1993) in the 1980's. Due to inherent biases associated with aerial surveys (glare, sea state, observer differences), in order to best compare current turtle densities and estimates to those in the 1980's we opted to replicate the older methods, reducing biases associated with changes in observer efficiency. Surveys were flown in an over-wing aircraft (Cessna XP II) at an altitude of 152 m, and at a speed of 130 km/hr. Sixty east-west transect lines were established over the Virginia portion of the Chesapeake Bay. The locations of these lines were based on the locations of the lines used in the 1980's (Keinath et al., 1987) (Figure 1). Two sub-regions were established with thirty transects falling within the Lower Bay region and thirty within the Upper Bay region (Figure 1). All transect lines fall within suitable loggerhead sea turtle habitat: no more than five miles up a tributary and in waters deeper than three meters.

Eight lines were randomly chosen for each survey, four within the Upper Bay region and four within the Lower Bay region. These transect lines were flown with the aid of a GPS unit. Surveys were flown once a week once a week between mid-May and the end of July, 2003, weather and sea state permitting. Two trained observers, one on each side of the plane, scanned the sea surface for turtles, marine mammals and fishing activity. The time was recorded at the start of each transect line. Each transect took between 12 and 20 minutes to complete. Transect lines flown were spaced far enough apart that the likelihood of a turtle swimming at higher known velocities (3.5 km/hr) counted subsequently within two adjacent transect lines is negligible (Byles, 1988). When an animal or fishing activity was sighted, the following were recorded:

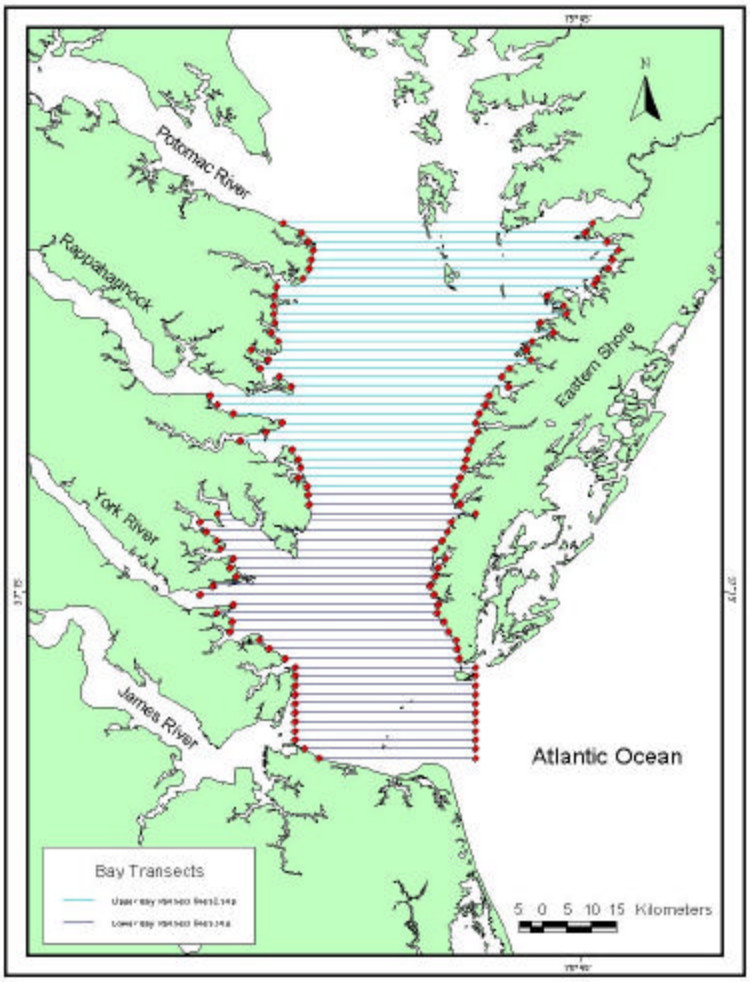

Figure 1. **Transect locations (including upper and lower Bay survey areas) for the Chesapeake Bay aerial surveys, 2001-2003.**

- Sighting angle from the transect line;
- Time and date of observation;
- Species/Activity (and number);
- Weather, sea state; solar glare.

Time at the end of each transect was also recorded. The time hat an animal or activity was observed was converted to distance along the transect line through back calculation, determining its location along the transect. The sighting angle, recorded with the use of Suunto inclinometers, was used to determine whether the animal/activity falls within the effective visual swath adjacent to the transect line, abeam of the airplane. The distance each animal/activity was from the transect line was recorded as an angle of degree. GPS units were not used to record the location of objects sighted since the airplane's electronics, located above the observer seats, often disrupted satellite signals and reliable location data were not consistently available.

Byles (1988) and Keinath (1993) estimated population densities using strip transect methodology. This method assumes that all turtles are counted within a given distance from each transect line, and that any turtles falling outside of the census area are not recorded. Both Byles (1988) and Keinath (1993) determined that the effective visual swath within which the peak sighting efficiency occurs is between 50 meters (18°) and

300 meters (63º) from the transect line (Musick et al., 1987). Over 90% of all sea turtle sightings occur within this range (Musick et al., 1984). Thus, the visual swath being surveyed (250 meters on either side of the plane) combined with transect length, allows for the calculation of minimum surface density estimates using strip transect analysis (Byles, 1988; Musick et al., 1987). Minimum sea turtle densities are determined using the following equations (Keinath, 1993):

$$\mathbf{D = N / A} \qquad \text{Eq. 1}$$

where: D = density of sea turtles observed
N = Total number of turtles observed
A = Area surveyed (km^2)

and: $$\mathbf{A = (O \times W) \times L} \qquad \text{Eq. 2}$$

where: O = Number of observers in the plane
W = width of survey area (km) per observer
L = Length of survey transect (km)

or: $$\mathbf{D = N / (0.5\ km \times L)} \qquad \text{Eq. 3}$$

Using radio telemetry data, Byles (1988) determined that loggerhead sea turtles spend approximately 5.3% of their time below the sea surface while resident in the Bay during the summer and fall months. Aerial survey observations only record those animals at the surface or within about one meter of the surface. The minimum density estimates must be multiplied by a correction factor in order to account for turtles below the observed sea surface. The correction factor is determined based on the ratio of time spent below the surface to time at the surface. The ratio used by VIMS for summer and fall estimates is 18.7:1 (turtles below surface to turtles at surface) (Musick et al., 1984; Byles, 1988). Thus, in order estimate the total number of turtles within the flight path, the following equation was applied:

$$\mathbf{D_{corr} = 18.7 \times D} \qquad \text{Eq. 4}$$

where: D_{corr} = Turtle density corrected for dive behavior

Densities were then determined for the lower Bay and upper Bay regions by extrapolating the corrected densities to the entire study region:

$$\mathbf{P = D_{corr} \times A_{tot}} \qquad \text{Eq. 5}$$

where: P = Estimated turtle population
A_{tot} = Total study area (km^2)

Areas for the Upper Bay and Lower Bay survey area (within the 3 meter depth contour) were calculated from distances and area recorded in ArcView 3.2 (UTM-1983).

III. RESULTS:

Eight population surveys were flown between May 14 and July 24, 2003. Population surveys began the second week of May and continued weekly, weather

permitting, until the end of July. Eight transect lines were flown on each survey, with the exception of the May surveys (seven and five transects flown), the June 11 survey (six transects flown) and July 16 survey (six transects) due to no turtle observations in the lower Bay transects or poor weather conditions. Transect length within the 3m-depth contour ranged between 23.82 km and 45.58 km, with survey area ranging between 10.74 km^2 and 21.00 km^2 per transect. Total survey area for the lower Bay was 636.61 km^2 and 507.50 km^2 for the upper Bay, however fewer flights were flown in the upper Bay than the lower. Estimates of total area for the entire lower and upper Bay regions were determined in ArcView 3.2 to be 1,529.36 km 1,879.41 km^2 and 1,879.41 km^2 respectively (UTM-1983 projection).

Two sea turtles were observed in the lower Bay during the first survey (May 14, however no sea turtles were subsequently observed until June 5th. The majority of turtles initially sighted in the spring of the year (June 5th survey) were located within the upper Bay region. Within the lower Bay, observed densities increased over time in June, peaking by the June 27th survey (Figure 2). All turtles observed were found between 50 and 300 to 350 meters from the transect line, and no more than 500 meters from the transect line. Minimum estimated sea turtle densities (uncorrected for diving behavior) were greatest in June within both the upper and lower Bay. Peak estimates were observed on June 27th within both regions (Figure 3). Per lower Bay survey, average densities ranged from either 0.00 turtles/km^2 or 0.034 turtles/km^2 (+/- 0.067 turtles/km^2) in May to 0.183 turtles/km^2 (+/- 0.137 turtles/km^2) in June (Table 1). Upper Bay densities ranged from 0.000 turtles/km^2 in May to 0.228 turtles/km^2 (+/- 0.344 turtles/km^2) the end of June (Table 1). Based on negative biases associated with strip-transect analyses and sea turtle sightability, these densities must be considered as minimum estimates.

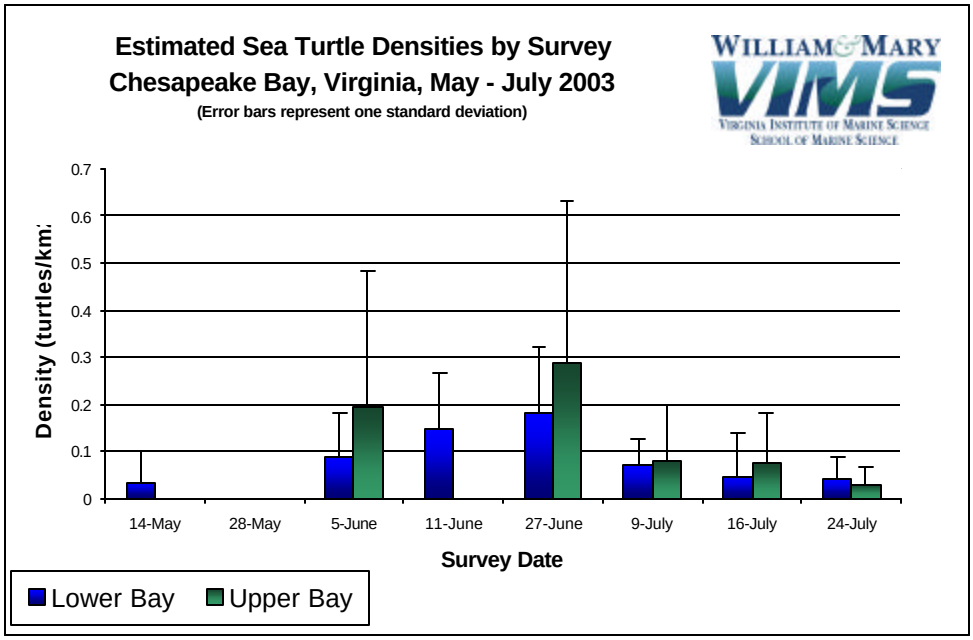

Figure 2. Estimated sea turtle densities per survey in the Chesapeake Bay, Virginia, 2003

Table 1. **Average sea turtle densities and population estimates per aerial survey, Chesapeake Bay, Virginia, 2003.**

Date	Location	Avg. Turtle/Transect	Avg. Densities	StDev Densities	Pop Est.	Avg Area per transect
5/14/03	Lower Bay	0.50	0.034	0.067	0.00	15.23
5/14/03	Upper Bay	0.00	0.000	0.000	0.00	16.47
5/28/03	Lower Bay	0.00	0.000	0.000	0.00	13.17
5/28/03	Upper Bay	0.00	0.000	0.000	0.00	11.84
6/5/03	Lower Bay	1.50	0.089	0.091	2577.28	15.41
6/5/03	Upper Bay	3.75	0.194	0.287	6879.91	18.06
6/11/03	Lower Bay	2.25	0.149	0.115	4318.97	15.23
6/11/03	Upper Bay	0.00	0.000	0.000	0.00	12.51
6/27/03	Lower Bay	2.75	0.183	0.137	5289.29	14.43
6/27/03	Upper Bay	3.75	0.288	0.344	10223.44	16.10
7/9/03	Lower Bay	1.00	0.071	0.056	2048.98	13.97
7/9/03	Upper Bay	1.25	0.080	0.117	2857.07	16.22
7/16/03	Lower Bay	0.50	0.047	0.093	1345.67	14.56
7/16/03	Upper Bay	1.00	0.076	0.107	2695.06	15.63
7/24/03	Lower Bay	0.50	0.040	0.048	1167.46	14.64
7/24/03	Upper Bay	0.50	0.031	0.037	1097.87	15.77

Extrapolated population estimates factoring in area surveyed and turtle surfacing behavior were calculated for the purposes of comparison with aerial survey work from the 1980's. Variance associated with the surfacing behavior correction factor is not apparent from available literature. As part of VIMS' future research, these estimates will be recalculated to include descriptive statistics, and incorporate radio tracking data from the 2002 and 2003 seasons including a quantification of seasonal surfacing patterns. Thus, for the purposes of this study, our extrapolated population estimates may only serve as a relative index of abundance in relation to the work presented in the 1980's. The Lower Bay population estimates, behaviorally corrected for densities and spatially extrapolated, ranged between 1,346 and 2,049 turtles in early July, to 5,289 turtles the last week of June (Table 1). Upper Bay estimates ranged between 1098 in late July and 10,223 turtles the last week in June (Table 1). Population estimates for both regions were highest during the month of June (Figure 3).

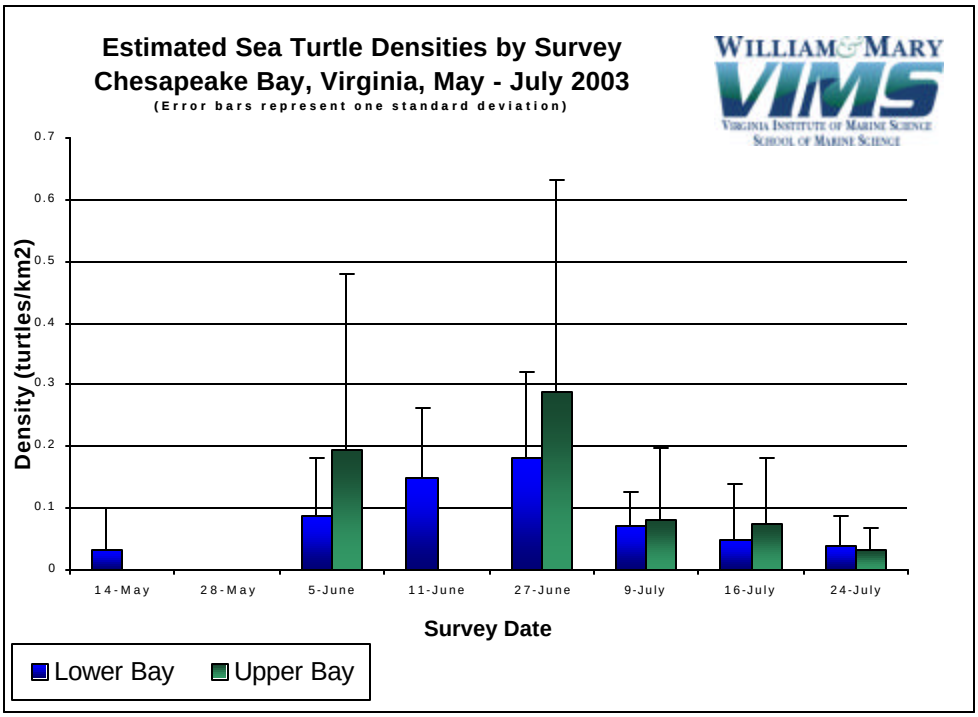

Figure 3. **Estimated sea turtle densities by survey in the Chesapeake Bay, Virginia, 2003.**

Gillnet activities were concentrated during the months of May and June with few or no nets observed in July. Two to nine nets were observed per survey mid-May through mid-June, with no nets observed the last survey in June (June 27th) (Figure 4). Crab pots were observed throughout the Bay and on every survey, blanketing Bay shorelines out to a depth of approximately ten meters. Due to the density of crab pots within the Bay, it was not possible to record every single pot within the strip transect (Appendix A). The distribution of crab pots in the Bay generally complied with the established Marine Protected Area and Corridor (MPAC) for the Bay's blue crab spawning stock, or "crab sanctuary". Recreational and commercial fishing boats were also observed throughout the Bay. Recreational fishing vessels were predominantly hook and line fishers and were often found in association with converging water masses/fronts. Commercial fishing boats, not including menhaden boats, were primarily comprised of crabbers (Figures 5 and 6; Appendix A) and located mostly outside the "crab sanctuary", within the 10-meter depth contour of the Bay.

Marine mammals were also observed during surveys. All mammals observed were a species of dolphin, most likely the bottlenose (*Tursiops truncatus*). Distribution of mammal sightings is provided in Appendix B. Most mammals were sighted during the first half of the summer and in highest concentrations in the lower Bay region. Mammal sightings ranged from one individual up to a group of five or more.

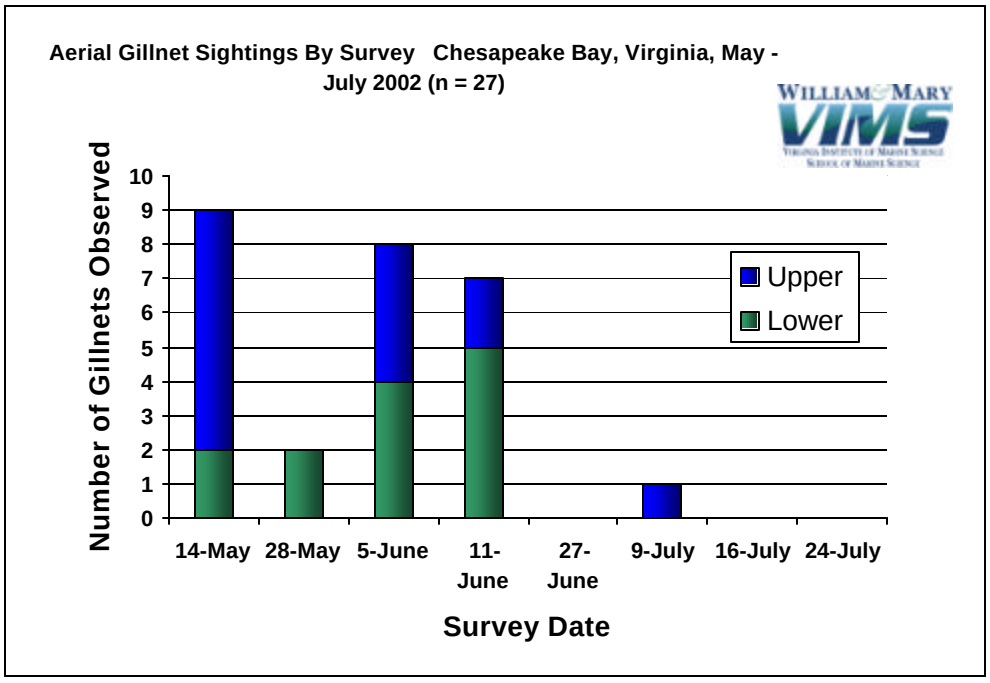

Figure 4. **Aerial gillnet sightings in the Chesapeake Bay, Virginia, 2003.**

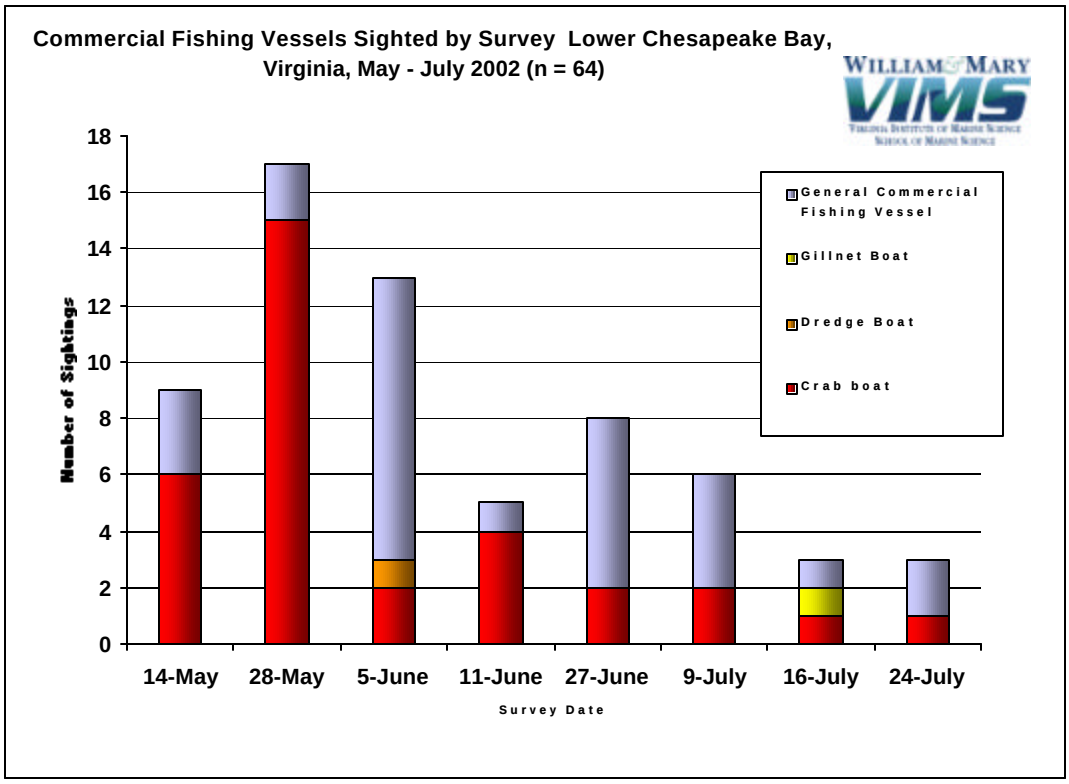

Figure 5. **Commercial fishing vessels sighted by survey in the lower Chesapeake Bay, Virginia, 2003.**

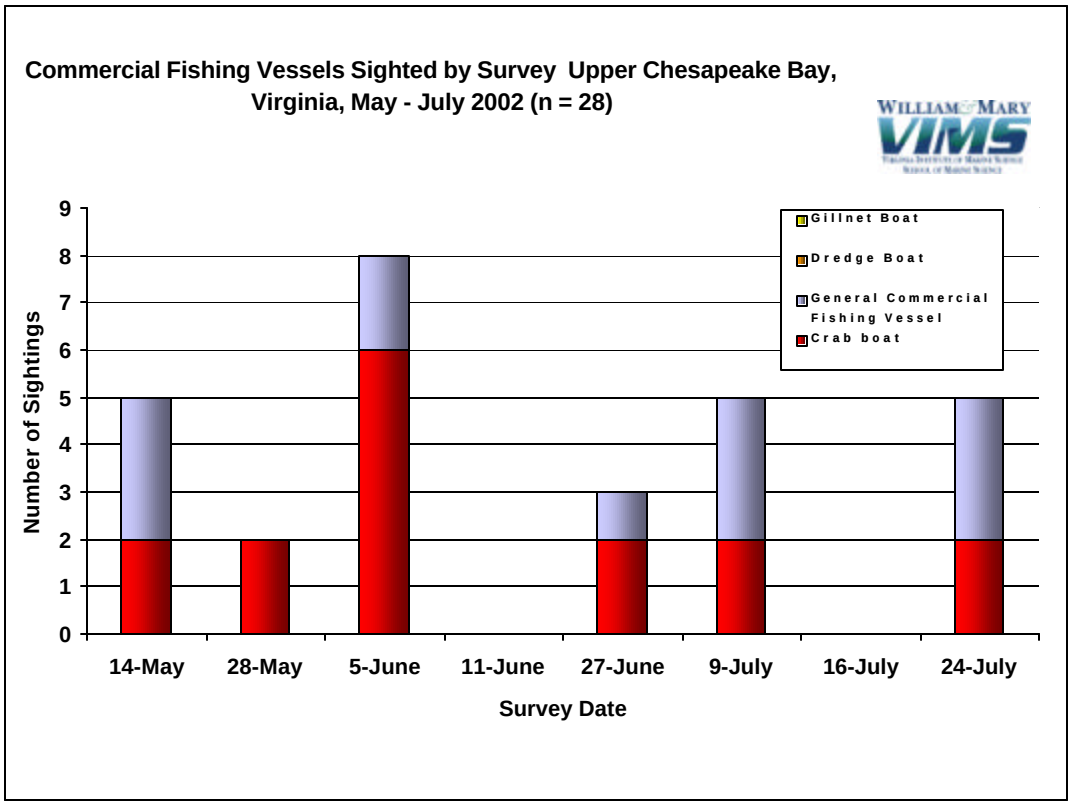

Figure 6. **Commercial fishing vessels sighted by survey in the upper Chesapeake Bay, Virginia, 2003.**

DISCUSSION:

Aerial strip transect method risks a negative bias in density calculations since this method assumes that all animals are seen and recorded within the survey strip. Turtles observed just outside the study swath must also be eliminated from the analysis. Thus, strip transect methods may only provide minimum density and population estimates. However, on a management level, underestimating the endangered/threatened turtle sub-population in Virginia is less detrimental than overestimating the population.

The distribution of sea turtles over time in 2003 was consistent with historic distributions of sea turtles observed during previous VIMS turtle surveys: the highest number of turtles observed were within the spring months, corresponding to the time when turtles are first migrating into Virginia's waters and the when peak stranding events are observed in Virginia. The peak in aerial densities was observed later in 2003 than in the past two years, however, springtime water temperatures were much cooler in 2003 than previous seasons. Similarly, the spring peak in sea turtle strandings did not occur until the last two weeks in June, corresponding to the observed peak in sea turtle densities. These peak numbers may be associated with a) a concentration of turtles moving into the Bay during the initial weeks of their residency period, after which they are found more evenly distributed within the upper and lower Bay; b) differences in

surfacing behaviors in the spring months vs. warmer summer moths; and/or c) some turtles entering into the Bay as a stop-over place to feed along their migration route to northern summer foraging habitats.

Aerial population surveys only record sea turtles visible at the surface of the water, requiring that a correction factor be applied to turtle observations in order to estimate population densities. The distribution, biology and behavior of sea turtles are strongly linked to the thermal regimes of a turtle's environment (Spotila et al., 1997). Byles' radio and sonic tracking work in the 1980's indicate that sea turtles spend approximately five percent of their time at the surface while foraging in the Bay during the summer months (Byles, 1988). However, surfacing behavior may vary with season (Keinath, 1993), particularly early in the springtime when sea temperatures are lower and waters are more stratified. To improve estimates of regional abundance from surface densities, VIMS is currently conducting radio tracking experiments to determine the amount of time turtles are visible on the sea surface throughout their residency in Virginia waters—particularly during the spring season. Determining whether sea turtles exhibit a difference in their inter-seasonal diving behaviors will help determine their vulnerability to different fishing/commercial gears, affecting incidental takes of turtles in near-shore fisheries. Past aerial correction factors for surfacing behavior were calculated only for loggerhead sea turtles—potentially biasing population estimates that would include Kemp's ridleys (previous aerial surveys did not distinguish between species). Radio tracking conducted by VIMS in the spring of 2002-2003 will help determine the correction factor necessary for turtle densities calculated seasonally and by species.

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APPENDICES

APPENDIX A. **Aerial sightings of fishing gear, commercial boats, and recreational fishing boats, May - July 2003.**

Codes:

CB	CRAB BOAT
CD	CRAB DREDGE
CFISH	GENERAL COMMERCIAL FISHING BOAT
CONT	CONTAINER VESSEL
DGE	DREDGE
GN	GILLNET (USUALLY REPRESENTING ONE FLAG)
GNB	GILLNET FISHING BOAT (FLAGS NOTED ON DECK)
MH	MENHADEN BOAT
MISC	MISC. GEAR OR VESSEL
OYD	OYSTER DREDGE
PN-A	POUND NET -ACTIVE
PN-I	POUND NET -INACTIVE
POTS	UNIDENTIFIED POTS (CRAB, WHELK OR SEABASS)
POTS-B	POTS FROM BEGINNING OF TRANSECT TO TIME INDICATED
POTS-E	POTS FROM TIME INDICATED TO END OF TRANSECT
PP	PEALER POUNDS
RFISH	RECREATIONAL FISHING BOAT (HOOK AND LINE)
RSAIL	RECREATIONAL SAILBOAT
STKGR	STAKED GEAR
TR	TRAWLER (FLOUNDER OR SCALLOP)

DATE	OBSERVER	REGION	TRANSECT	CATEGORY	COMMENTS
5/14/03		1 Lower Bay	9	CB	
5/14/03		2 Lower Bay	9	CBBT	
5/14/03		1 Lower Bay	9	CBBT	
5/14/03		2 Lower Bay	9	POTS	1 line
5/14/03		2 Lower Bay	9	POTS	3 pots
5/14/03		2 Lower Bay	9	POTS	
5/14/03		2 Lower Bay	9	POTS	1 line
5/14/03		1 Lower Bay	9	POTS-B	
5/14/03		1 Lower Bay	9	RFISH	
5/14/03		2 Lower Bay	11	2 PN-I	2 offshore, inactive
5/14/03		2 Lower Bay	11	CB	
5/14/03		1 Lower Bay	11	CB	In transit
5/14/03		2 Lower Bay	11	PN-A, PN-I	Older inactive further north of active, buoy leader
5/14/03		2 Lower Bay	11	POTS	Pots through next entry
5/14/03		2 Lower Bay	11	POTS	
5/14/03		2 Lower Bay	11	POTS	
5/14/03		1 Lower Bay	11	POTS	Pots through next entry
5/14/03		1 Lower Bay	11	POTS	
5/14/03		1 Lower Bay	11	POTS	Pots through next entry
5/14/03		1 Lower Bay	11	POTS	
5/14/03		2 Lower Bay	11	POTS-E	
5/14/03		1 Lower Bay	11	RFISH	
5/14/03		1 Lower Bay	11	RFISH	

5/14/03	2 Lower Bay	19 CB	
5/14/03	1 Lower Bay	19 CB (3)	3 crab boats
5/14/03	1 Lower Bay	19 CFISH	
5/14/03	1 Lower Bay	19 CFISH (2)	2 comm. fishing vessels, in transit
5/14/03	1 Lower Bay	19 GN	1 flag
5/14/03	1 Lower Bay	19 PN-A (2)	2 active PN, buoyed leaders
5/14/03	1 Lower Bay	19 PN-I	Old inactive stand
5/14/03	1 Lower Bay	19 PN-I	
5/14/03	1 Lower Bay	19 PN-I	
5/14/03	1 Lower Bay	19 POTS	
5/14/03	1 Lower Bay	19 POTS	3 lines (N-S)
5/14/03	1 Lower Bay	19 POTS	2 lines (N-S)
5/14/03	1 Lower Bay	19 POTS	1 line
5/14/03	1 Lower Bay	19 POTS	1 line
5/14/03	1 Lower Bay	19 POTS	1 line
5/14/03	2 Lower Bay	19 POTS	
5/14/03	2 Lower Bay	19 POTS	Pots through next entry
5/14/03	2 Lower Bay	19 POTS	
5/14/03	2 Lower Bay	19 POTS	
5/14/03	2 Lower Bay	19 POTS	
5/14/03	2 Lower Bay	19 POTS	
5/14/03	1 Lower Bay	19 POTS-B	
5/14/03	2 Lower Bay	19 POTS-E	
5/14/03	1 Lower Bay	19 RFISH (12)	12 rec. fishing vessels
5/14/03	1 Lower Bay	22 CB	In transit
5/14/03	2 Lower Bay	22 CB	
5/14/03	2 Lower Bay	22 GN	1 flag
5/14/03	2 Lower Bay	22 PN-A (2)	2 active PN (WCB's nets)
5/14/03	1 Lower Bay	22 POTS	Pots through next entry
5/14/03	1 Lower Bay	22 POTS	
5/14/03	1 Lower Bay	22 POTS	2 lines
5/14/03	1 Lower Bay	22 POTS	Pots through next entry
5/14/03	1 Lower Bay	22 POTS	
5/14/03	1 Lower Bay	22 POTS	1 line
5/14/03	1 Lower Bay	22 POTS	Pots through next entry
5/14/03	1 Lower Bay	22 POTS	
5/14/03	2 Lower Bay	22 POTS	Pots through next entry
5/14/03	2 Lower Bay	22 POTS	
5/14/03	2 Lower Bay	22 POTS	
5/14/03	2 Lower Bay	22 POTS	
5/14/03	2 Lower Bay	22 POTS	Pots through next entry
5/14/03	2 Lower Bay	22 POTS	
5/14/03	2 Lower Bay	22 POTS-E	
5/14/03	1 Lower Bay	22 RFISH	
5/14/03	1 Lower Bay	22 RFISH (2)	2 rec. fishing vessels
5/14/03	1 Upper Bay	35 GN	1 flag
5/14/03	2 Upper Bay	35 POTS	
5/14/03	2 Upper Bay	35 POTS	
5/14/03	1 Upper Bay	35 POTS	2 lines
5/14/03	1 Upper Bay	35 POTS	1 line (N-S)

5/14/03	1 Upper Bay	35 POTS	1 line (N-S)
5/14/03	2 Upper Bay	35 POTS-E	
5/14/03	2 Upper Bay	35 RFISH	
5/14/03	1 Upper Bay	37 CFISH	
5/14/03	1 Upper Bay	37 GN	1 flag
5/14/03	2 Upper Bay	37 GN	2 flags, ~600'
5/14/03	2 Upper Bay	37 GN	2 flags, ~3-400' (short)
5/14/03	1 Upper Bay	37 GN (2)	4 flags in pairs = 2 GN
5/14/03	1 Upper Bay	37 MISC	Orange ball float?
5/14/03	1 Upper Bay	37 POTS	1 line (N-S)
5/14/03	1 Upper Bay	37 POTS	1 line (N-S)
5/14/03	1 Upper Bay	37 POTS	Pots through next entry
5/14/03	1 Upper Bay	37 POTS	
5/14/03	1 Upper Bay	37 POTS	Pots through next entry
5/14/03	1 Upper Bay	37 POTS	
5/14/03	2 Upper Bay	37 POTS	Pots through next entry
5/14/03	2 Upper Bay	37 POTS	
5/14/03	2 Upper Bay	37 POTS	
5/14/03	2 Upper Bay	37 POTS	Pots through next entry
5/14/03	2 Upper Bay	37 POTS	
5/14/03	2 Upper Bay	37 POTS	
5/14/03	2 Upper Bay	37 POTS	Pots through next entry
5/14/03	2 Upper Bay	37 POTS	
5/14/03	2 Upper Bay	37 POTS	Pots through next entry
5/14/03	2 Upper Bay	37 POTS	
5/14/03	2 Upper Bay	37 POTS	Pots through next entry
5/14/03	2 Upper Bay	37 POTS	
5/14/03	2 Upper Bay	37 POTS	
5/14/03	2 Upper Bay	37 POTS	
5/14/03	2 Upper Bay	37 POTS-E	
5/14/03	1 Upper Bay	37 RFISH	
5/14/03	1 Upper Bay	37 RFISH	
5/14/03	1 Upper Bay	44 CB	
5/14/03	1 Upper Bay	44 CB	
5/14/03	1 Upper Bay	44 CFISH (2)	2 commercial fishing vessels
5/14/03	2 Upper Bay	44 GN	1 flag
5/14/03	1 Upper Bay	44 MISC	Tug and barge (heading south)
5/14/03	1 Upper Bay	44 MISC	Tug and barge (heading north)
5/14/03	1 Upper Bay	44 POTS	Pots through next entry
5/14/03	1 Upper Bay	44 POTS	
5/14/03	1 Upper Bay	44 POTS	Pots through next entry
5/14/03	1 Upper Bay	44 POTS	
5/14/03	1 Upper Bay	44 POTS	Pots through next entry
5/14/03	1 Upper Bay	44 POTS	Pots through next entry
5/14/03	1 Upper Bay	44 POTS	
5/14/03	1 Upper Bay	44 POTS	2 lines
5/14/03	1 Upper Bay	44 POTS	Pots through next entry
5/14/03	1 Upper Bay	44 POTS	
5/14/03	1 Upper Bay	44 POTS	
5/14/03	1 Upper Bay	44 POTS	1 line

5/14/03	2 Upper Bay	44 POTS	Pots through next entry
5/14/03	2 Upper Bay	44 POTS	
5/14/03	2 Upper Bay	44 POTS	Pots through next entry
5/14/03	2 Upper Bay	44 POTS	
5/14/03	2 Upper Bay	44 POTS	
5/14/03	2 Upper Bay	44 POTS-E	
5/28/03	2 Lower Bay	1 CB	
5/28/03	1 Lower Bay	1 CB	In transit to the west
5/28/03	1 Lower Bay	1 CB	
5/28/03	1 Lower Bay	1 CFISH	
5/28/03	2 Lower Bay	1 GN	
5/28/03	1 Lower Bay	1 GN	2 flags
5/28/03	1 Lower Bay	1 GN?	1 yellow flag/buoy
5/28/03	2 Lower Bay	1 LB	Longline boat
5/28/03	2 Lower Bay	1 MISC	Navy boat
5/28/03	2 Lower Bay	1 MISC	Container ship
5/28/03	1 Lower Bay	1 MISC	~8 military vessels
5/28/03	2 Lower Bay	1 POTS	Many
5/28/03	1 Lower Bay	1 POTS	1 line (N-S)
5/28/03	1 Lower Bay	1 POTS	
5/28/03	2 Lower Bay	1 RFISH	
5/28/03	2 Lower Bay	1 RFISH	
5/28/03	1 Lower Bay	1 RFISH	
5/28/03	2 Lower Bay	18 CB	
5/28/03	1 Lower Bay	18 POTS	Two
5/28/03	1 Lower Bay	18 POTS	~20
5/28/03	1 Lower Bay	18 POTS	Pots through next entry
5/28/03	1 Lower Bay	18 POTS	
5/28/03	1 Lower Bay	18 POTS	Pots through next entry
5/28/03	1 Lower Bay	18 POTS	
5/28/03	2 Lower Bay	18 POTS	
5/28/03	2 Lower Bay	18 POTS	
5/28/03	2 Lower Bay	18 POTS	Many
5/28/03	2 Lower Bay	18 POTS	Many
5/28/03	2 Lower Bay	18 POTS	
5/28/03	2 Lower Bay	23 CB	
5/28/03	2 Lower Bay	23 CB	
5/28/03	1 Lower Bay	23 CB	
5/28/03	1 Lower Bay	23 CFISH	
5/28/03	1 Lower Bay	23 PN-A	WCB's net
5/28/03	2 Lower Bay	23 PN-A (2)	Two active poundnets
5/28/03	2 Lower Bay	23 POTS	
5/28/03	2 Lower Bay	23 POTS	
5/28/03	1 Lower Bay	23 POTS	1 line
5/28/03	1 Lower Bay	23 POTS	Pots through next entry
5/28/03	1 Lower Bay	23 POTS	
5/28/03	1 Lower Bay	23 POTS	Pots through next entry
5/28/03	1 Lower Bay	23 POTS	
5/28/03	1 Lower Bay	23 POTS	2 lines (N-S)

5/28/03	1 Lower Bay	23 POTS	Pots through next entry	
5/28/03	1 Lower Bay	23 POTS		
5/28/03	1 Lower Bay	23 POTS	~10	
5/28/03	1 Lower Bay	23 RFISH		
5/28/03	2 Lower Bay	29 CB		
5/28/03	2 Lower Bay	29 CB		
5/28/03	2 Lower Bay	29 CB (2)		
5/28/03	2 Lower Bay	29 CB (2)		
5/28/03	2 Lower Bay	29 MISC	Research/fishing vessel	
5/28/03	2 Lower Bay	29 POTS		
5/28/03	2 Lower Bay	29 POTS		
5/28/03	2 Lower Bay	29 POTS		
5/28/03	2 Lower Bay	29 POTS		
5/28/03	1 Lower Bay	29 POTS	1 line (N-S)	
5/28/03	1 Lower Bay	29 POTS	1 line (N-S)	
5/28/03	2 Lower Bay	29 RFISH		
5/28/03	1 Lower Bay	29 RFISH (4)		
5/28/03	2 Upper Bay	31 CB (2)		
5/28/03	1 Upper Bay	31 POTS	Pots through next entry	
5/28/03	1 Upper Bay	31 POTS		
5/28/03	1 Upper Bay	31 POTS	Pots through next entry	
5/28/03	1 Upper Bay	31 POTS		
5/28/03	2 Upper Bay	31 POTS	Many	
5/28/03	2 Upper Bay	31 POTS		
5/28/03	1 Upper Bay	31 POTS-B		
5/28/03	1 Upper Bay	31 RFISH		
5/28/03	1 Upper Bay	31 RFISH		
5/28/03	2 Upper Bay	31 RFISH (repeat)	Seen on last transect	
9-Jul-03	2 Lower Bay	2 CB		
9-Jul-03	2 Lower Bay	2 CONT	CAR CARRIER	
9-Jul-03	1 Lower Bay	2 CONT	CONTAINER SHIP	
9-Jul-03	1 Lower Bay	2 CONT	CONTAINER SHIP	
9-Jul-03	2 Lower Bay	2 FLAG	FLAG GEAR	
9-Jul-03	1 Lower Bay	2 MM	DOLPHIN	
9-Jul-03	2 Lower Bay	2 POTS		
9-Jul-03	1 Lower Bay	2 RAYS		5
9-Jul-03	2 Lower Bay	2 RFISH		
9-Jul-03	2 Lower Bay	2 RFISH		4
9-Jul-03	1 Lower Bay	2 RFISH		8
9-Jul-03	1 Lower Bay	2 RFISH		
9-Jul-03	1 Lower Bay	4 MISC	HELICOPTER	
9-Jul-03	2 Lower Bay	4 BARGE	AND TUG	
9-Jul-03	1 Lower Bay	4 CFISH		
9-Jul-03	1 Lower Bay	4 CFISH		
9-Jul-03	2 Lower Bay	4 CFISH	TRAWLER HEAVY-GOOD CATCH	
9-Jul-03	1 Lower Bay	4 CONT	CONTAINER SHIP	
9-Jul-03	2 Lower Bay	4 MISC	3 NAVAL BOATS	
9-Jul-03	1 Lower Bay	18 CONT	CONTAINER SHIP	
9-Jul-03	2 Lower Bay	18 PN-A		

9-Jul-03	2 Lower Bay	18 POTS	8 STRINGS	
9-Jul-03	1 Lower Bay	18 POTS	STRING	
9-Jul-03	1 Lower Bay	18 POTS		
9-Jul-03	1 Lower Bay	18 RFISH		2
9-Jul-03	1 Lower Bay	21 BARGE	AND TUG	
9-Jul-03	1 Lower Bay	21 CB		2
9-Jul-03	1 Lower Bay	21 CFISH		
9-Jul-03	2 Lower Bay	21 GEAR	STAKED GEAR	
9-Jul-03	2 Lower Bay	21 POTS	2 STRINGS	
9-Jul-03	2 Lower Bay	21 POTS	2 STRINGS	
9-Jul-03	2 Lower Bay	21 POTS	6 STRINGS	
9-Jul-03	1 Lower Bay	21 POTS-B		
9-Jul-03	1 Lower Bay	21 POTS-B		
9-Jul-03	1 Lower Bay	21 POTS-E		
9-Jul-03	1 Lower Bay	21 POTS-E		
9-Jul-03	2 Lower Bay	21 RFISH		
9-Jul-03	2 Lower Bay	21 RFISH		
9-Jul-03	1 Upper Bay	35 CFISH	LARGE	
9-Jul-03	1 Upper Bay	35 CFISH		
9-Jul-03	2 Upper Bay	35 POTS	2 STRINGS	
9-Jul-03	2 Upper Bay	35 POTS	STRING	
9-Jul-03	1 Upper Bay	35 POTS		
9-Jul-03	1 Upper Bay	37 CFISH		
9-Jul-03	2 Upper Bay	37 POTS	3 STRINGS	
9-Jul-03	2 Upper Bay	37 POTS		
9-Jul-03	1 Upper Bay	37 POTS-B		
9-Jul-03	1 Upper Bay	37 POTS-E		
9-Jul-03	1 Upper Bay	37 RFISH		
9-Jul-03	1 Upper Bay	37 RFISH		
9-Jul-03	1 Upper Bay	37 RFISH		
9-Jul-03	1 Upper Bay	37 RFISH		
9-Jul-03	2 Upper Bay	37 RFISH		
9-Jul-03	2 Upper Bay	55 PN-A		2
9-Jul-03	1 Upper Bay	55 PN-A		
9-Jul-03	2 Upper Bay	55 POTS		
9-Jul-03	2 Upper Bay	55 POTS		
9-Jul-03	1 Upper Bay	55 POTS	STRING	
9-Jul-03	1 Upper Bay	55 POTS	STRING	
9-Jul-03	1 Upper Bay	55 POTS	STRING	
9-Jul-03	1 Upper Bay	55 POTS-B		
9-Jul-03	1 Upper Bay	55 POTS-E		
9-Jul-03	1 Upper Bay	55 RFISH		
9-Jul-03	1 Upper Bay	55 RFISH		
9-Jul-03	1 Upper Bay	55 RFISH		2
9-Jul-03	1 Upper Bay	55 RFISH		
9-Jul-03	1 Upper Bay	55 RFISH		
9-Jul-03	1 Upper Bay	60 BARGE		
9-Jul-03	2 Upper Bay	60 CB		2
9-Jul-03	2 Upper Bay	60 CB		9
9-Jul-03	2 Upper Bay	60 GN		

9-Jul-03	2 Upper Bay	60	PN-A	
9-Jul-03	1 Upper Bay	60	PN-A	
9-Jul-03	1 Upper Bay	60	PN-A	
9-Jul-03	1 Upper Bay	60	PN-I	INACTIVE
9-Jul-03	2 Upper Bay	60	POTS	6 STRINGS
9-Jul-03	2 Upper Bay	60	POTS	2 STRINGS
9-Jul-03	2 Upper Bay	60	POTS	3 STRINGS
9-Jul-03	2 Upper Bay	60	POTS	9 STRINGS
9-Jul-03	2 Upper Bay	60	POTS	STRING
9-Jul-03	2 Upper Bay	60	POTS	10 STRINGS
9-Jul-03	2 Upper Bay	60	POTS	8 STRINGS
9-Jul-03	2 Upper Bay	60	POTS	5 STRINGS
9-Jul-03	2 Upper Bay	60	POTS	2 STRINGS
9-Jul-03	2 Upper Bay	60	POTS	2 STRINGS
9-Jul-03	2 Upper Bay	60	POTS	2 STRINGS
9-Jul-03	2 Upper Bay	60	POTS	5 STRINGS
9-Jul-03	2 Upper Bay	60	POTS	4 STRINGS
9-Jul-03	1 Upper Bay	60	POTS	3
9-Jul-03	1 Upper Bay	60	POTS-B	
9-Jul-03	1 Upper Bay	60	POTS-E	
9-Jul-03	2 Upper Bay	60	RFISH	
9-Jul-03	2 Upper Bay	60	RFISH	
9-Jul-03	1 Upper Bay	60	RFISH	2
9-Jul-03	1 Upper Bay	60	RFISH	4
16-Jul-03	1 Lower Bay	8	CBBT	
16-Jul-03	2 Lower Bay	8	CBBT	
16-Jul-03	2 Lower Bay	8	CONT	CONTAINER SHIP
16-Jul-03	1 Lower Bay	8	MISC	MILITARY VESSEL
16-Jul-03	1 Lower Bay	8	RFISH	
16-Jul-03	1 Lower Bay	8	RFISH	
16-Jul-03	1 Lower Bay	8	RFISH	2
16-Jul-03	1 Lower Bay	8	RFISH	2
16-Jul-03	2 Lower Bay	8	RFISH	
16-Jul-03	2 Lower Bay	8	RFISH	ABOUT 35
16-Jul-03	1 Lower Bay	17	CFISH	
16-Jul-03	2 Lower Bay	17	GNB	
16-Jul-03	2 Lower Bay	17	MISC	MILITARY VESSEL
16-Jul-03	2 Lower Bay	17	POTS	35 IN A STRING
16-Jul-03	2 Lower Bay	17	POTS	20 IN A STRING
16-Jul-03	2 Lower Bay	17	POTS	ABOUT 50
16-Jul-03	1 Lower Bay	17	RFISH	
16-Jul-03	2 Lower Bay	17	RFISH	INTRANSIT
16-Jul-03	2 Lower Bay	17	RFISH	
16-Jul-03	1 Lower Bay	17	RSAIL	
16-Jul-03	2 Lower Bay	26	CB	
16-Jul-03	2 Lower Bay	26	POTS	40
16-Jul-03	2 Lower Bay	26	RFISH	
16-Jul-03	1 Lower Bay	26	RFISH	
16-Jul-03	1 Lower Bay	26	RFISH	
16-Jul-03	2 Upper Bay	30	PN-IN	

16-Jul-03	2 Upper Bay	30 POTS		5
16-Jul-03	2 Upper Bay	30 POTS	STRING N/S	
16-Jul-03	2 Upper Bay	30 POTS	STRING N/S	
16-Jul-03	1 Upper Bay	30 POTS		5
16-Jul-03	2 Upper Bay	30 RFISH		4
16-Jul-03	2 Upper Bay	30 RFISH		3
16-Jul-03	1 Upper Bay	30 RFISH		
16-Jul-03	1 Upper Bay	30 RFISH	14 ENDS-10:26:46	
16-Jul-03	1 Upper Bay	34 BARGE		
16-Jul-03	1 Upper Bay	34 CONT	CONTAINER SHIP	
16-Jul-03	1 Upper Bay	34 RFISH		
16-Jul-03	1 Upper Bay	34 RFISH		10
16-Jul-03	2 Upper Bay	39 PN-A		
16-Jul-03	2 Upper Bay	39 POTS		
16-Jul-03	1 Upper Bay	39 POTS-B		
16-Jul-03	2 Upper Bay	39 POTS-B		
16-Jul-03	2 Upper Bay	39 POTS-B		
16-Jul-03	1 Upper Bay	39 POTS-E		
16-Jul-03	2 Upper Bay	39 POTS-E		
16-Jul-03	2 Upper Bay	39 POTS-E	PARALLEL TO SHORE	
16-Jul-03	2 Upper Bay	39 RFISH	5 AND 2 HEAD BOATS	
16-Jul-03	2 Upper Bay	39 RFISH		4
16-Jul-03	2 Upper Bay	39 RFISH		7
24-Jul-03	1 Lower Bay	4 BARGE	AND TUG HEADING WEST	
24-Jul-03	1 Lower Bay	4 CBBT		
24-Jul-03	2 Lower Bay	4 CBBT		
24-Jul-03	1 Lower Bay	4 CONT	CONTAINER SHIP-HEADING EAST	
24-Jul-03	2 Lower Bay	4 MISC	NAVAL SUPPLY BOAT	
24-Jul-03	2 Lower Bay	4 POTS		
24-Jul-03	2 Lower Bay	4 RFISH		2
24-Jul-03	1 Lower Bay	4 TUG		
24-Jul-03	1 Lower Bay	8 BARGE	AND TUG HEADING NORTH	
24-Jul-03	2 Lower Bay	8 CBBT		
24-Jul-03	1 Lower Bay	8 CBBT		
24-Jul-03	2 Lower Bay	8 RFISH		
24-Jul-03	1 Lower Bay	19 CB		
24-Jul-03	1 Lower Bay	19 CFISH	INTRANSIT	
24-Jul-03	1 Lower Bay	19 PN-A	BOUYED LEADER	
24-Jul-03	2 Lower Bay	19 PN-IN		
24-Jul-03	2 Lower Bay	19 PN-IN		
24-Jul-03	1 Lower Bay	19 PN-IN		
24-Jul-03	1 Lower Bay	19 POTS-B		
24-Jul-03	1 Lower Bay	19 POTS-E		
24-Jul-03	1 Lower Bay	19 RFISH		
24-Jul-03	2 Lower Bay	19 TUG	WITH 2 MUD SCOWS	
24-Jul-03	2 Lower Bay	29 POTS		
24-Jul-03	2 Lower Bay	29 POTS	6 STRINGS	
24-Jul-03	1 Lower Bay	29 POTS	LINE N/S	
24-Jul-03	1 Lower Bay	29 POTS	LINE N/S	
24-Jul-03	1 Lower Bay	29 POTS	LINE N/S	

24-Jul-03	1 Lower Bay	29 POTS-B		
24-Jul-03	1 Lower Bay	29 POTS-B		
24-Jul-03	1 Lower Bay	29 POTS-E		
24-Jul-03	1 Lower Bay	29 POTS-E		
24-Jul-03	2 Lower Bay	29 RFISH		5
24-Jul-03	1 Lower Bay	29 RFISH		2
24-Jul-03	2 Upper Bay	32 CB		
24-Jul-03	1 Upper Bay	32 CFISH	INTRANSIT NORTH	
24-Jul-03	1 Upper Bay	32 CFISH	INTRANSIT WEST	
24-Jul-03	2 Upper Bay	32 POTS		
24-Jul-03	2 Upper Bay	32 POTS		
24-Jul-03	1 Upper Bay	32 POTS-B		
24-Jul-03	1 Upper Bay	32 POTS-B		
24-Jul-03	1 Upper Bay	32 POTS-E		
24-Jul-03	1 Upper Bay	32 POTS-E		
24-Jul-03	1 Upper Bay	35 RFISH	CLAM DREDGE BOAT	
24-Jul-03	2 Upper Bay	35 POTS	4 STRINGS	
24-Jul-03	2 Upper Bay	35 POTS	4 STRINGS	
24-Jul-03	1 Upper Bay	35 POTS-B		
24-Jul-03	1 Upper Bay	35 POTS-E		
24-Jul-03	1 Upper Bay	50 CB		
24-Jul-03	2 Upper Bay	50 TR	TRAWL	
24-Jul-03	2 Upper Bay	50 POTS	8 STRINGS	
24-Jul-03	2 Upper Bay	50 POTS	3 STRINGS	
24-Jul-03	2 Upper Bay	50 POTS		
24-Jul-03	2 Upper Bay	50 POTS		
24-Jul-03	1 Upper Bay	50 POTS	ABOUT 30	
24-Jul-03	1 Upper Bay	50 POTS-B		
24-Jul-03	1 Upper Bay	50 POTS-B		
24-Jul-03	1 Upper Bay	50 POTS-B		
24-Jul-03	1 Upper Bay	50 POTS-B		
24-Jul-03	1 Upper Bay	50 POTS-E		
24-Jul-03	1 Upper Bay	50 POTS-E		
24-Jul-03	1 Upper Bay	50 POTS-E		
24-Jul-03	1 Upper Bay	50 POTS-E		
24-Jul-03	1 Upper Bay	50 RFISH		2
24-Jul-03	1 Upper Bay	54 PN-A	10 NETS, ALL ACTIVE, NO LEADERS	
24-Jul-03	2 Upper Bay	54 POTS	3 STRINGS	
24-Jul-03	2 Upper Bay	54 POTS	STRING	
24-Jul-03	2 Upper Bay	54 POTS	3 STRINGS	
24-Jul-03	2 Upper Bay	54 POTS	7 STRINGS	
24-Jul-03	2 Upper Bay	54 POTS	4 STRINGS	
24-Jul-03	2 Upper Bay	54 POTS	6 STRINGS	
24-Jul-03	1 Upper Bay	54 POTS	N/S	
24-Jul-03	1 Upper Bay	54 POTS-B		
24-Jul-03	1 Upper Bay	54 POTS-B		
24-Jul-03	1 Upper Bay	54 POTS-B		
24-Jul-03	1 Upper Bay	54 POTS-E		
24-Jul-03	1 Upper Bay	54 POTS-E		
24-Jul-03	1 Upper Bay	54 POTS-E		

24-Jul-03	1 Upper Bay	54 TUG	AND 2 BARGES HEADING S

APPENDIX B. Aerial sightings of sea turtles and marine mammals, May - July 2003.

Category Codes:

CC	LOGGERHEAD (*Caretta caretta*)
LK	KEMP'S RIDLEY (*Lepidochelys kempi)*
MM	MARINE MAMMAL
MM POD	MARINE MAMMAL POD
MM DEAD	DEAD MARINE MAMMAL
ST	SEA TURTLE (UNIDENTIFIED SPECIES)
ST-DEAD	DEAD SEA TURTLE

DATE	OBSERVER	REGION	TRANSECT	CATEGORY	COMMENTS
5/14/03		1	Lower Bay	9	MM 1 Tursiops
5/14/03		1	Lower Bay	9	MM POD ~8 Tursiops
5/14/03		2	Lower Bay	11	MM 2 Tursiops swimming south
5/14/03		2	Lower Bay	11	MM 3 dolphins
5/14/03		2	Lower Bay	11	MM POD Pod of dolphins
5/14/03		1	Lower Bay	11	MM POD ~4 Tursiops
5/14/03		1	Lower Bay	22	ST Cc, submerged
5/14/03		2	Lower Bay	22	ST Cc, floating/sort of swimming
5-Jun-03		1	Lower Bay	14	ST LK
5-Jun-03		1	Lower Bay	19	MM 1-Tursiops
5-Jun-03		2	Lower Bay	19	MM (6) 6-Tursiops
5-Jun-03		1	Lower Bay	19	ST CC, diving
5-Jun-03		2	Lower Bay	19	ST CC
5-Jun-03		2	Lower Bay	19	ST CC
5-Jun-03		2	Lower Bay	19	ST CC
5-Jun-03		2	Lower Bay	22	ST CC
5-Jun-03		1	Upper Bay	39	ST CC, submerged
5-Jun-03		2	Upper Bay	48	ST CC
5-Jun-03		2	Upper Bay	48	ST CC
5-Jun-03		2	Upper Bay	48	ST small, unid.
5-Jun-03		2	Upper Bay	48	ST small, unid.
5-Jun-03		2	Upper Bay	48	ST small, unid.
5-Jun-03		2	Upper Bay	48	ST CC
5-Jun-03		2	Upper Bay	48	ST CC
5-Jun-03		2	Upper Bay	48	ST CC, submerged
5-Jun-03		2	Upper Bay	48	ST CC, submerged
5-Jun-03		2	Upper Bay	48	ST CC
5-Jun-03		2	Upper Bay	48	ST CC
5-Jun-03		2	Upper Bay	48	ST CC
5-Jun-03		1	Upper Bay	52	ST subsurface, unid.
5-Jun-03		1	Upper Bay	52	ST CC
5-Jun-03		2	Upper Bay	52	ST CC
11-Jun-03		2	Lower Bay	4	MM (2) 2 Tursiops
11-Jun-03		1	Lower Bay	4	ST CC, surface, swimming
11-Jun-03		2	Lower Bay	4	ST CC
11-Jun-03		2	Lower Bay	4	ST CC
11-Jun-03		2	Lower Bay	4	ST CC
11-Jun-03		2	Lower Bay	15	ST CC
11-Jun-03		2	Lower Bay	15	ST CC
11-Jun-03		2	Lower Bay	26	ST CC
11-Jun-03		2	Lower Bay	26	ST CC

11-Jun-03	2Lower Bay	26ST	CC
27-Jun-03	2Lower Bay	16ST	CC
27-Jun-03	2Lower Bay	16ST	CC
27-Jun-03	1Lower Bay	16ST	CC
27-Jun-03	1Lower Bay	23MM	Dolphin/Tursiops
27-Jun-03	2Lower Bay	23ST	CC
27-Jun-03	2Lower Bay	23ST	CC
27-Jun-03	1Lower Bay	23ST	CC
27-Jun-03	2Lower Bay	24ST	CC
27-Jun-03	2Lower Bay	24ST	CC
27-Jun-03	2Lower Bay	24ST	CC
27-Jun-03	2Lower Bay	24ST	CC
27-Jun-03	1Lower Bay	24ST	
27-Jun-03	2Lower Bay	24MM	Dolphin/Tursiops-4
27-Jun-03	1Upper Bay	32ST	
27-Jun-03	1Upper Bay	32ST	CC
27-Jun-03	2Upper Bay	32ST	CC
27-Jun-03	2Upper Bay	32ST	CC
27-Jun-03	2Upper Bay	32ST	CC
27-Jun-03	2Upper Bay	32ST	
27-Jun-03	2Upper Bay	32ST	CC
27-Jun-03	2Upper Bay	32ST	CC
27-Jun-03	2Upper Bay	32ST	CC
27-Jun-03	2Upper Bay	32ST	CC
27-Jun-03	2Upper Bay	37ST	CC
27-Jun-03	2Upper Bay	37ST	CC
27-Jun-03	1Upper Bay	37ST	
27-Jun-03	2Upper Bay	44ST	CC
27-Jun-03	2Upper Bay	46ST	CC
27-Jun-03	2Upper Bay	46ST	CC
9-Jul-03	1Lower Bay	2MM	TURSIOPS
9-Jul-03	2Lower Bay	4ST	CC
9-Jul-03	2Lower Bay	4ST	CC
9-Jul-03	2Lower Bay	4MM	2-TURSIOPS
9-Jul-03	2Lower Bay	4MM	15-TURSIOPS
9-Jul-03	2Lower Bay	18ST	LK
9-Jul-03	2Lower Bay	18MM	12-TURSIOPS
9-Jul-03	2Lower Bay	21ST	CC
9-Jul-03	1Lower Bay	21ST	UNKNOWN
9-Jul-03	1Upper Bay	35ST	UNKNOWN
9-Jul-03	2Upper Bay	37MM	4-TURSIOPS
9-Jul-03	2Upper Bay	60ST	CC
9-Jul-03	2Upper Bay	60ST	CC
9-Jul-03	2Upper Bay	60ST	CC
9-Jul-03	2Upper Bay	60ST	CC
16-Jul-03	2Upper Bay	30ST	UNIDENTIFIED
16-Jul-03	2Upper Bay	30ST	CC
16-Jul-03	1Upper Bay	34ST	CC
16-Jul-03	2Upper Bay	34ST	CC
24-Jul-03	2Lower Bay	8ST	CC
24-Jul-03	2Lower Bay	29ST	UNIDENTIFIED
24-Jul-03	1Upper Bay	32MM-DEAD	TURSIOPS
24-Jul-03	2Upper Bay	35ST	CC